Name: **Enrolment No:**	

UPES

End Semester Examination, December 2023

Course: Introduction to AI&ML
Semester: III
Program: B.Tech-CS-AIML **Time : 03 hrs.**
Course Code: CSAI2012 **Max. Marks: 100**

Instructions: Attempt all questions. However, internal choices are mentioned if applicable.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Find the probability of not getting a 7 or 11 total on either of two tosses of a pair of fair dice.	**4**	**CO1**
Q 2	Define propositional logic and provide examples of propositions.	**4**	**CO1**
Q 3	Explain the fundamental difference between supervised learning and unsupervised learning. Provide examples of real-world applications for each.	**4**	**CO2**
Q 4	When would you prioritize precision over recall, and vice versa, in a specific real-world application?	**4**	**CO3**
Q 5	What is an Artificial Neural Network (ANN) and what distinguishes it from traditional algorithms in solving complex problems?	**4**	**CO4**

SECTION B
(4Qx10M= 40 Marks)

Q 6	Define linear regression and multiple linear regression. How does multiple linear regression differ from simple linear regression? Provide a practical example of when each might be used.	**10**	**CO3**
Q 7	If $E(X) = 5$ and $Var(X) = 9$, use Chebyshev's Inequality to find an upper bound on $P(|X - 5| \geq 6)$.	**10**	**CO2**
Q 8	What is the role of activation functions in neural networks? Provide examples of commonly used activation functions and describe their purposes.	**10**	**CO4**

Q 9	Compare and contrast Gradient Descent and Stochastic Gradient Descent as optimization techniques in training neural networks. How do factors like learning rate (η) impact the convergence of the algorithms? Or, Define key terminologies used in Natural Language Processing, such as tokenization, stemming, part-of-speech tagging, Co-reference resolution, Discourse Analysis and Pragmatics.	**10**	**CO4**
SECTION-C (2Qx20M=40 Marks)			
Q 10	How does the K-Nearest Neighbors (K-NN) classifier work, and what are its strengths and limitations in different applications?	**20**	**CO5**
Q 11	Describe the mutation operation in Genetic Algorithms, its role in introducing variability in the population, and how it prevents premature convergence. Or, Explain the concept of frames as a knowledge representation technique. Provide specific examples of frames and describe their components in detail.	**20**	**CO5/C01**